

DEPARTMENT OF AGRICULTURE, BENGAL.

ANNUAL REPORT

OF THE

CUTTACK AGRICULTURAL STATION

FOR THE YEAR 1910-1911.



CALCUTTA:

BENGAL SECRETARIAT BOOK DEPÔT.

1912.

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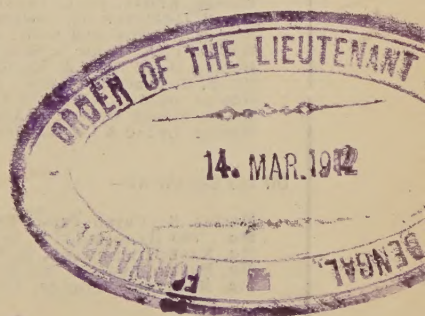
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ANNUAL REPORT OF THE OUTTACK EXPERIMENTAL FARM, 1910-11.

THIS farm was started in 1904 with the object of demonstrating the value of irrigation in the district. It is situated in latitude 20°30' N. and longitude 86°E. near the head of the Mahanadi river, and consists of about 120 acres of land, of which a tank occupies some 10 acres.

The soil, except for a few acres of high and very sandy land, consists of sandy loam resting on a similar sub-soil.

The analyses in table I seems to show that the finer particles are washed out of the surface soil, which is poor in the more important plant foods and contains an undue proportion of magnesia, and might therefore be expected to pay for judicious manuring, liming and deep cultivation.

TABLE I.

INGREDIENTS,			Surface soil,	Sub soil,
			1st 9" Per cent.	2nd 9" Per cent.
Insoluble silicates and sand	...	...	86.66	84.33
Ferrie oxide	...	...	3.74	4.83
Alumina	...	...	5.52	6.37
Lime	...	...	.30	.39
Magnesia	...	...	.59	.41
Potash	...	...	.24	.33
Soda	...	...	.03	.17
Phosphoric acid	...	...	.03	.03
Sulphuric acid	...	...	.01	.007
Carbonic acid	...	...	.05	.06
†Organic matter and combined water	...	...	2.83	3.07
Total	...	...	100.00	100.00
†Containing Nitrogen	...	...	.004	.004

The average rainfall for Cuttack, and the actual amounts, and the number of rainy days at the farm for each month of the last four years, are shewn in table II.

TABLE II.

Month.	Normal rainfall at Cuttack Sadar.	ACTUAL RAINFALL AT THE FARM.				ACTUAL NUMBER OF RAINY DAYS AT THE FARM.			
		1907-08.	1908-09.	1909-10.	1910-11.	1907-08.	1908-09.	1909-10.	1910-11.
April ...	1.35"	5.88"	0.05"	3.96"	0.88"	9	1	11	2
May ...	3.54"	2.02"	1.92"	3.26"	2.27"	8	5	8	8
June ...	10.91"	5.63"	19.24"	8.52"	9.92"	16	15	22	16
July ...	12.06"	6.77"	7.02"	22.80"	14.23"	13	22	25	19
August ...	12.43"	29.31"	23.54"	12.15"	19.28"	21	25	17	21
September ...	10.48"	9.43"	8.27"	11.03"	10.94"	12	16	17	22
October ...	5.75"	0.31"	1.71"	0.79"	9.22"	2	3	2	16
November ...	1.36"	...	...	...	...	...	...	...	...
December ...	0.35"	0.83"	...	2.40"	...	5	...	5	...
January ...	0.33"	0.95"	...	1.26"	...	3	...	3	...
February ...	0.50"	...	1.25"	...	0.27"	...	1	...	1
March ...	1.31"	0.35"	...	...	1.10"	1	...	...	4
Total ...	60.40"	61.54"	63.00"	66.17"	68.11"	90	88	110	109

In the year under report heavy rain in the first week of August caused floods on the river and stopped the drainage of the farm, the greater part of which was under water for about a fortnight. The result was complete failure of the cotton crop and considerable damage to sugarcane and groundnut; and to paddy, the newly transplanted fields of which had to be replanted. Excessive rain in the second and third weeks of October, when the paddy was in flower, by interfering with the formation of grain, also reduced the outturn. The chief crops experimented with were paddy, sugarcane and groundnuts. Cotton failed, as mentioned above, and jute was destroyed by "Indigo caterpillars."

As regards the last two crops, the soil and situation are probably not suitable for cotton; while, though it has been shewn that jute can be grown both here and at Burdwan by heavy manuring and irrigation, it is clear that it cannot pay under these circumstances, except when for some reason or other the crop falls short in the more

favoured districts in which it is commonly grown without either manure or irrigation.

On paddy, experiments were tried with different manures and varieties, and ; with methods of cultivation, transplanting, seeding and watering.

Paddy manures.—Table III shews the scheme of the manurial experiments, the results for the last five years, and the average. The results for the year under report were somewhat irregular, owing to the floods referred to, but not sufficiently so to warrant their exclusion.

TABLE III.

Number of plots.	MANURE.		OUTTURN PER ACRE IN MAUNDS (80 LBS.).											
			1906-07.		1907-08.		1908-09.		1909-10.		1910-11.		Average.	
			Grain.	Straw.	Grain.	Straw.	Grain.	Straw.	Grain.	Straw.	Grain.	Straw.	Grain.	Straw.
			Mds.	Mds.	Mds.	Mds.	Mds.	Mds.	Mds.	Mds.	Mds.	Mds.	Mds.	Mds.
1	Farm cow-dung.	50	14½	22½	26	60	32	64½	22½	51½	25½	47½	24	49½
2	Village khatta	50	13	21½	25	60	31½	65	29½	60	20½	46	23½	50½
3	Unmanured ...	...	10½	20	21½	61	30½	70½	20½	50½	25½	47½	21½	50
4	Cowdung ...	100	15½	23½	27	63½	33½	71½	23½	45	27	52½	25½	51½
5	{ Ditto ...	100	16	25	27½	60	34	70½	23½	43½	27½	50	25½	50
	{ Super phosphate.	3												
6	{ Cowdung ...	100	16½	26½	29	61	34½	71½	25	45	28½	48½	26½	50½
	{ Saltpetre ...	1												
7	{ Cowdung ..	100	19½	25½	30	60	35½	73	26½	63½	30	47½	28½	54
	{ Super phosphate.	3												
	{ Saltpetre ...	1												
8	{ Bonemeal ...	3	17½	24½	28½	60	32½	66½	24½	50½	28½	50	26½*	50½
	{ Saltpetre ...	1												
9	Unmanured...	...	...	...	22½	61	36	65½	19	57½	29½	41	23½*	56½
10	Green manure Dbaincha.	...	12½	21½	29	63	36½	70½	26	61½	29½	52½	26½	53½
11	{ Cowdung ...	100	...	...	30	68	37	72½	27½	56½	27½	48½	30½†	61½
	{ Super phosphate.	3												
	{ Saltpetre ...	1												
	{ Sulphate of magnesia.	1												

* Average of 4 good years. The duplicate gave a greater outturn for the same 4 years

† Average of 4 good years. Compare plot 9.

The results are on the whole remarkably consistent, and tend to shew that, while all the manures except superphosphate and sulphate of magnesia produced a decided result, the most economical was decidedly the ploughing in of *dhaincha*. Fifty maunds of cowdung per acre gave an increase of nearly $2\frac{1}{2}$ maunds of grain, while the addition of another 50 maunds gave not quite half the same increase and, farmyard manure being always scarce, the second 50 maunds could obviously be more economically applied to a second acre. This seems to apply almost universally in Bengal. Bonemeal and saltpetre gave an increased yield of over $4\frac{1}{2}$ maunds of grain—not enough to pay for the manure; but 3 maunds of bonemeal were almost equivalent to 100 maunds of cowdung in its results in combination with saltpetre, and it will be worth starting a series of experiments to ascertain just how much, if any, bonemeal can be profitably applied with and without saltpetre, both being applied in smaller quantities.

Sulphate of magnesia.—An experiment to test the value of sulphate of magnesia applied in the last week of September or early in October has been tried since 1907. The results, shewn in table IV, shew no advantage in the practice.

TABLE IV.

Number of plot.	MANURE.	OUTTURN PER ACRE IN MAUNDS (80 LBS.).									
		1907-08.		1908-09.		1909-10.		1910-11.		Average.	
		Grain.	Straw.	Grain.	Straw.	Grain.	Straw.	Grain.	Straw.	Grain.	Straw.
		Mds.	Mds.	Mds.	Mds.	Mds.	Mds.	Mds.	Mds.	Mds.	Mds.
1	Sulphate of magnesia	1	26	61	29	62	21	48 $\frac{1}{2}$	23 $\frac{1}{2}$	43 $\frac{3}{4}$	24 $\frac{1}{2}$
2	Cowdung ...	100									
			26 $\frac{1}{2}$	63 $\frac{1}{2}$	30	63 $\frac{1}{2}$	21 $\frac{1}{2}$	49 $\frac{1}{2}$	25	50 $\frac{1}{2}$	25 $\frac{1}{2}$
3	Sulphate of magnesia	1									
	Cowdung ...	100									
	Superphosphate ...	3									
	Saltpetre ...	1									
	Sulphate of magnesia	1									
4	Unmanured ...	...	22 $\frac{1}{2}$	60	28	65	20	50	21 $\frac{1}{2}$	43	23
5	Sulphate of magnesia	2	25 $\frac{1}{2}$	61	30 $\frac{1}{2}$	66 $\frac{1}{2}$	22	41 $\frac{1}{2}$	22 $\frac{1}{2}$	40 $\frac{1}{2}$	25
	Cowdung ...	100									
6			27 $\frac{1}{2}$	65	31	68 $\frac{1}{2}$	22 $\frac{1}{2}$	43 $\frac{1}{2}$	23 $\frac{1}{2}$	38 $\frac{1}{2}$	26 $\frac{1}{2}$
7	Sulphate of magnesia	2									
	Sulphate of magnesia	5	24 $\frac{1}{2}$	61 $\frac{1}{2}$	30 $\frac{1}{2}$	69 $\frac{1}{2}$	22	48 $\frac{1}{2}$	25	44	25 $\frac{1}{2}$
	Cowdung ...	100									
8			26	65	31 $\frac{1}{2}$	66 $\frac{1}{2}$	23	50	26 $\frac{1}{2}$	45	26 $\frac{1}{2}$
	Sul. of magnesia ...	3									

Comparing this with the results obtained at Bankipur, where a very greatly increased outturn was obtained although there was, as here,

already an excess of magnesia in the soil, it seems as if the sandy nature of the soil at Cuttaek may have negated the advantage of the application of the salt. A comparison of the water in the fields at these two farms at the end of September, both from the chemical and biological points of view, would be interesting; as the evidence points to the existence at that season of some deleterious factor in the water in the fields at Bankipur which apparently does not exist here.

Paddy varieties.—Varieties of paddy have been grown for five years with the result shown in table V.

The finest varieties, *hasagundi*, *badshabhog* and *kalajira*, have done remarkably well; and, with the coarser variety *dudkalma* head the list. The local *hasagundi* is clearly about the best to grow, and all experiments should probaoly be tried on this variety. Having regard to the difference in price, there seems no object in growing the coarser paddies in this district, unless for special purposes.

TABLE V.

OUTTURN PER ACREE IN MAUNDS (80 LBS.).													
		1906-07.		1907-08.		1908-09.		1909-10.		1910-11.		Average.	
		Grain.	Straw.	Grain.	Straw.	Grain.	Straw.	Grain.	Straw.	Grain.	Straw.	Grain.	Straw.
		Mds.	Mds.	Mds.	Mds.	Mds.	Mds.	Mds.	Mds.	Mds.	Mds.	Mds.	Mds.
Dudkalma ...	1	21	40½	27½	57½	31½	62½	26½	42½	35½	52½	28½	51
Hatisal ...	5	15	22½	30	62½	32½	60½	25	53½	28	43½	26½	48½
Benaphuli ...	5	13½	17½	32½	65	37½	66½	25½	50½	22½	43½	26½	49½
Komode ...	13	6½	18½	25½	60½	30½	58½	25½	41½	15½	40	20½	43½
Sukhvel ...	12	10½	21	26	62	28½	52½	18½	32½	23½	40	21½	41½
Dadkhani ...	11	15½	21½	28½	55	30½	62	20½	40	31½	66½	25½	49
Samudrabali ...	9	15	21½	26½	42½	34	64	37	41½	26½	42½	25½	42½
Badshabhog ...	3	14½	20	27½	40	37½	58½	29½	40½	31	35	28	39
Kalajira ...	4	13½	23½	29½	46½	32	60½	30½	46½	26	40½	27½	42½
Khasagundi ...	1	20	26½	30	43½	35	59½	29	47½	28½	41½	33½	44½
Kherajali ...	5	15½	22½	30	57½	32½	70½	27½	41½	26	46½	26½	47½
Chingarbhusi ...	8	15	20½	30½	60	30	73	27	41½	27½	48½	26	48½
Banktulshi ...	9	16½	24½	30	62½	33	72½	21½	40½	27½	62½	25½	52½
Banka ...	14	8½	21	24½	52	24½	66½	15	37½	31½	32½	18½	41½

Number of seedlings transplanted.—From table VI it appears that there is no advantage in planting more than one seedling per hole.

as far as outturn goes. The question now to be determined is whether the economy of seed effected by the thinner sowing of seed beds more than counterbalances any extra labour that may be involved in the extra care required to ensure the survival of single plants.

TABLE VI.

Seedlings transplanted per hole.	OUTTURN PER ACRE IN MAUNDS (80 LBS.)											
	1906-07.		1907-08.		1908-09.		1909-10.		1910-11.		Average.	
	Grain.	Straw.	Grain.	Straw.	Grain.	Straw.	Grain.	Straw.	Grain.	Straw.	Grain.	Straw.
	Mds.	Mds.	Mds.	Mds.	Mds.	Mds.	Mds.	Mds.	Mds.	Mds.	Mds.	Mds.
1 Seedlings, per hole ...	19	22½	26½	50	34½	60½	28	50	32½	42½	28	44½
2 Seedlings, ditto ...	18	23½	26	55	37½	61½	24½	56½	33	45	27½	48
4 Ditto ditto ...	17	23½	25½	65½	36	67½	22½	58½	31½	43½	26½	52
8 Ditto ditto ...	16½	26	25½	72½	36½	60	24½	60	31½	52½	27	54

Quantity of seed for broadcasting.—The results shewn in table VII are in favour of sowing 30 seers per acre.

TABLE VII.

Quantity of seed per acre.	OUTTURN PER ACRE IN MAUNDS (80 LBS.)											
	1906-07.		1907-08.		1908-09.		1909-10.		1910-11.		Average.	
	Grain.	Straw.	Grain.	Straw.	Grain.	Straw.	Grain.	Straw.	Grain.	Straw.	Grain.	Straw.
	Mds.	Mds.	Mds.	Mds.	Mds.	Mds.	Mds.	Mds.	Mds.	Mds.	Mds.	Mds.
40 ...	13½	16	22½	42½	38	88	29½	56	32½	58½	27	1½
35 ...	18½	30½	21½	34½	42	87½	20½	51	32½	53½	28½	51½
30 ...	16½	26½	22½	41½	43½	84½	32½	52½	34½	53½	29½	51½
25 ...	15	21½	20	39	46	77½	30½	51½	31½	51	28½	48½

Different kinds of ploughs.—Table VIII shews a decided advantage in using a plough that turns the land over for paddy cultivation. The result is perhaps due to the more efficient burying of weeds, for which purpose the Sibpur plough, though an iron plough, is not well constructed. The cost of use and upkeep of the Meston and Burdwan

ploughs will have to be ascertained before any definite recommendations can be made.

TABLE VIII.

Kind of plough.	OUTTURN PER ACRE IN MAUNDS (80 LBS.)											
	1906-07.		1907-08.		1908-09.		1909-10.		1910-11.		Average.	
	Grain.	Straw.	Grain.	Straw.	Grain.	Straw.	Grain.	Straw.	Grain.	Straw.	Grain.	Straw.
	Mds.	Mds.	Mds.	Mds.	Mds.	Mds.	Mds.	Mds.	Mds.	Mds.	Mds.	Mds.
Cuttack	16½	33½	25	40½	41	80½	32½	71½	34½	46	29½	52½
Burdwan	27½	55½	26½	40½	41½	83	34½	66½	35½	51	33	59½
Sibpur	26½	44½	22½	40	38½	84½	34½	72½	31½	45½	30½	57½
Meston	30½	53½	27½	40½	45	83	37½	78½	35	53½	35	62
Hindustan	31½	58½	27½	41½	48	85	38½	81½	32½	46½	34	62½

Irrigation experiments.—Table IX(a) shewa the advantage of irrigation.

TABLE IX(a).

	1906-07.		1907-08.		1908-09.		1909-10.		1910-11.		Average.	
	Grain.	Straw.	Grain.	Straw.	Grain.	Straw.	Grain.	Straw.	Grain.	Straw.	Grain.	Straw.
	Mds.	Mds.	Mds.	Mds.	Mds.	Mds.	Mds.	Mds.	Mds.	Mds.	Mds.	Mds.
Irrigated	21½	30½	25½	49½	34½	58½	17	36½	32½	43½	26½	43½
Unirrigated	15½	34½	21	27½	29	45½	16	40½	30½	43½	22½	38½

As would be expected, it is much more marked in some years than in others.

Table IX(b) shows a remarkably consistent, though small, advantage in keeping the water 6 inches deep in the fields, as against 3 inches,

TABLE IX(b).

Quantity of water applied.	OUTTURN PER ACRE IN MDS. (80 LBS.).									
	1906-07.		1907-08.		1908-09.		1909-10.		1910-11.	
	Grain.	Straw.	Grain.	Straw.	Grain.	Straw.	Grain.	Straw.	Grain.	Straw.
	Mds.	Mds.	Mds.	Mds.	Mds.	Mds.	Mds.	Mds.	Mds.	Mds.
6" water...	17	30	28	61½	34	63	18 ⁷ / ₈	32½	31 ⁵ / ₈	41½
3" „ ...	15½	26	26½	59	32½	63½	17 ⁷ / ₈	29	30 ⁵ / ₈	37½

This slight advantage is perhaps due to the better suppression of weeds and would not be worth securing except when the water-supply is ample.

Rotation of paddy and jute in the same year.—Table X shows that when the price of jute is high, it may pay in this district to grow an early crop with irrigation and heavy manuring; utilising the residues of the manure for paddy transplanted as soon as possible after the removal of the jute. The chief advantage probably lies in the possibility of getting an early crop of jute on to the market before the high prices that warranted the sowing of jute under these conditions have entirely given way before the prospect of the new crop. A hundred maunds of cowdung per acre and 2 maunds of bonemeal before sowing, and 2 maunds or more of saltpetre, according to the price ruling for fibre, applied in small quantities at intervals of a fortnight to the growing crop, is a good dressing.

As the table shows, an excellent crop of paddy will generally assist in paying for the manure applied.

TABLE X.

CROP.	OUTTURN PER ACRE IN MAUNDS (80 LBS.).														
	1906-07.			1907-08.			1908-09.			1909-10.			1910-11.		
	Grain.	Straw.	Fibre.	Grain.	Straw.	Fibre.	Grain.	Straw.	Fibre.	Grain.	Straw.	Fibre.	Grain.	Straw.	Fibre.
Aman Paddy	Mds.	Mds.	Mds.	Mds.	Mds.	Mds.	Mds.	Mds.	Mds.	Mds.	Mds.	Mds.	Mds.	Mds.	Mds.
Jute	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
	18½	33½	...	32	50	...	20	40	...	37½	56½	...	34½	46½	...
	...	...	17½	...	...	15	...	...	16½	...	...	19½	...	...	18½

Aus paddy.—Table XI shows the result for the last two years of the comparison of varieties of *aus* paddies.

As regards Central Provinces fine *aus* and the local coarse variety Benibhog, these results contradict those obtained from 1905 to 1908 as given in the report for 1908-09, which should be referred to. The result is perhaps due to the ample rainfall of the last two years which no doubt favoured the coarser variety.

Sixty-one maunds of seed of the Central Provinces variety were distributed in the year under report.

TABLE XI.

	1909-10.				1910-11.				AVERAGE.			
	BROAD-CASTED.		TRANS-PLANTED.		BROAD-CASTED.		TRANS-PLANTED.		BROAD-CASTED.		TRANS-PLANTED.	
	Grain.	Straw.	Grain.	Straw.	Grain.	Straw.	Grain.	Straw.	Grain.	Straw.	Grain.	Straw.
	Mds.	Mds.	Mds.	Mds.	Mds.	Mds.	Mds.	Mds.	Mds.	Mds.	Mds.	Mds.
Central Provinces fine <i>aus</i> .	17½	48	19½	46½	19½	50½	25½	50½	18½	49½	22½	48½
Benibhog	22½	50½	27	48½	24½	65	25½	66½	23½	57½	26½	57½
Kinshu	11½	41½	16½	34	...	...	19½	35	...	...	19	34½

Groundnut.—This crop has been grown under observation since 1905. It gives about 20 maunds per acre, worth about Rs. 5 per maund, which gives a very good profit. Many varieties have been tried in Madras, some of which, particularly those grown under irrigation in the hot weather, give a much higher yield than others. They are all worth a trial at this station. The crop is perhaps the most promising of all for sandy land such as covers a great part of the district, and no effort should be spared to give it a thorough trial. The price leaves a margin for very considerable expenses in cultivation, irrigation and manure. In Madras it has been found to do better in alternate rows with a variety of millet than alone, the shade appearing to benefit the groundnut. For details of the cultivation on this farm, the report of 1908-09 should be referred to.

Sugarcane.—Since 1907, when the Khari and Mango varieties of cane were first successfully grown on this farm, they have been taken up to a considerable extent by local cultivators; nearly 4,000 whole canes and 40,000 cuttings of the "Mango" variety were distributed locally for planting in the year under report. The results

of four years' trial on the farm (shown in table XII) are very satisfactory, particularly as regards "Mango" which is in an excellent cane for this district, ripening as it does gradually, and being at its best in the first week of March as shown by Mr. Taylor at Sabour.

The long season at Cuttack gives such a late ripening cane every chance of producing a full outturn, and when the purity of the juice is considered, there is every reason to encourage the cultivation in this district of a cane which has given such a good outturn on this farm for four years.

TABLE XII.

Variety.	OUTTURN OF GUR PER ACRE.				
	1907-08.	1908-09.	1909-10.	1910-11.	Average.
	Mds.	Mds.	Mds.	Mds.	Mds.
Khari ...	72 $\frac{3}{4}$ 69 $\frac{3}{4}$	54 $\frac{1}{4}$ 52	41 $\frac{1}{2}$ 64 $\frac{1}{2}$	42 $\frac{7}{8}$ 68 $\frac{1}{2}$	52 $\frac{7}{8}$ 63 $\frac{3}{4}$

Sugarcane—Manurial experiments.—Particular attention should be given to the manurial experiments on sugarcane of this farm. The climate and irrigation facilities are favourable and the conditions are thus ideal for the profitable use of large quantities of manure.

Table XIII shows the results obtained.

TABLE XIII.

Manure.		KHARI.		MANGO.	
		1908-09.	1909-10.	1910-11.	Average.
	Mds.	Mds.	Mds.	Mds.	Mds.
Oilcake	20	54 $\frac{1}{4}$	44	69 $\frac{1}{5}$	56
Superphosphate	3				
Oilcake	20	45 $\frac{1}{4}$	41	68 $\frac{7}{8}$	51 $\frac{3}{8}$
Cowdung	400	37	50	73 $\frac{1}{4}$	53 $\frac{1}{2}$
Unmanured	...	31	45 $\frac{3}{4}$	55 $\frac{3}{4}$	44 $\frac{1}{6}$

In 1909-10 the manurial experimental plots were badly damaged by jackals—hence the irregularity in the results.

On the whole, however, they show that oilcake is perhaps the best all-round manure for sugarcane—of those tried here.

Having regard to the poverty of the soil in phosphate, lime and potash and the value of nitrogen to the cane crop, there is every reason to suppose that bonemeal applied before the crop is planted and small dressings of saltpetre at intervals between the middle of October and the middle of December would be profitable—particularly with “Mango” cane, which would still have a clear two months to mature after the latter date. Two or three maunds of bonemeal and up to 4 or 5 of saltpetre in addition to 20 maunds of oilcake, applied in two or three top dressings during the monsoon, would not be excessive.

Green manuring for sugarcane, bonemeal being used as a manure for the green manure crop, might also pay well.

On the whole, there seems to be a great opportunity on this farm of demonstrating the possibilities of growing valuable crops by the aid of heavy manuring where irrigation is available and the climate favourable, in spite of the relative poverty of the soil.

Sugarcane and groundnuts appear to provide the basis of, profitable rotations on the medium and higher lands, respectively. Groundnuts might also grow well on lower land under irrigation, from February till June, as certain varieties are grown in Madras, bringing in gross receipts of as much as Rs. 200 per acre in good years. Other less paying crops such as *aman* and *aus* paddy are probably only worth growing on irrigable land when and where more valuable crops cannot be persuaded to grow or, if necessary, to prolong a rotation.

Practical training of students.—Two farm overseers and seven student cultivators received practical training on the farm in the year under report. The farm is under the direct management of Babu R. N. Roy who supplied the figures on which this report is based, and whose experience should enable him to be of the greatest value and assistance to those who are in a position to take advantage of the improvements introduced on the farm.

A. C. DOBBS.

